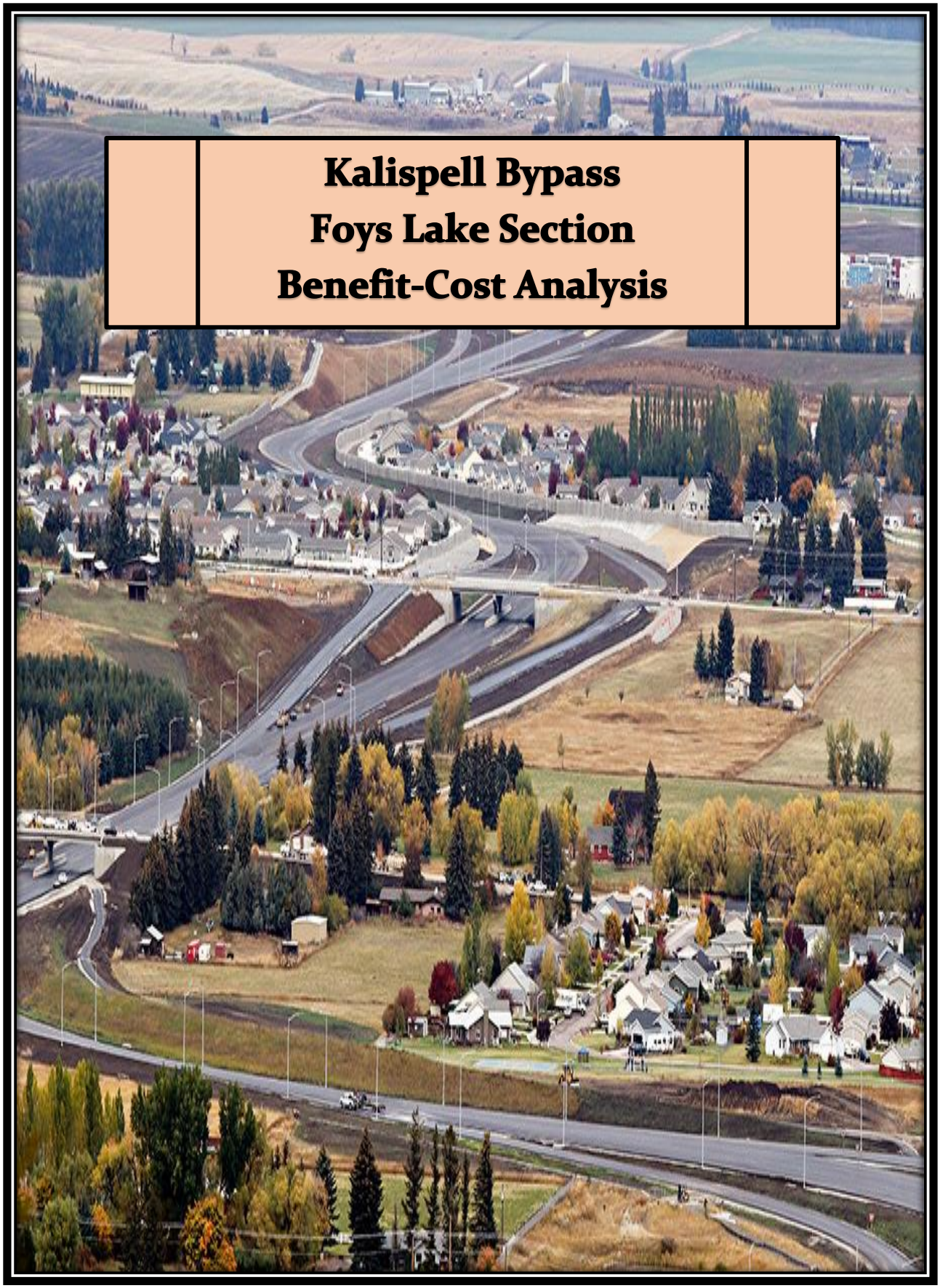
# Kalispell Bypass
# Foys Lake Section
# Benefit-Cost Analysis



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## Executive Summary

This benefit-cost analysis is for constructing 1.9 miles of four-lane highway for the Kalispell Bypass: Foys Lake Section and an interchange at the Foys Lake intersection. The current condition for this section of the Kalispell Bypass is a two-lane facility with a roundabout at the Foys Lake intersection. Current traffic counts along with macro level modeling for the Kalispell Urban Area and micro level modeling for the Bypass demonstrates that a significant traffic capacity issue exists and is expected to fail due to the volume of traffic greatly exceeding the capacity which the current facility can handle.

BUILD Grant funds along with MDT national highway funds will construct the Foys Lake four-lane section and Foys Lake Interchange and provide improved traffic capacity and traffic operations for this section of the Bypass. Along with improved traffic capacity, fuel savings and emissions reductions will be realized with the construction of this project. The construction of this project will provide an improved quality of life for the area by enhancing the existing urban transportation network's capacity and operation.

*Table 1: Project Matrix*

| Project Matrix - Kalispell Bypass : Foys Lake Section Project | | | | | | |
|---|---|---|---|---|---|---|
| **Current Status/Baseline & Problem to be Addressed** | **Change to Baseline/ Alternatives** | **Type of Impacts** | **Population Affected by Impacts** | **Economic Benefits** | **Summary of Results** | **Page Reference in BCA** |
| The south half of the 7 mile long Kalispell Bypass is a two-lane facility controlled by roundabouts at access points. The north half is built to its intended final configuration of four-lanes with interchanges at access points. The Foys Lake Section is the transition point from two lanes to four lanes and the traffic demand has created a significant traffic capacity issue for the roundabout's capacity. The result is significant congestion, delay, and queuing for the increasing number of users. | The current two-lane facility is expanded to a four-lane facility for the 1.9 mile Foys Lake Section of the south half of the Kalispell Bypass. This expansion includes replacing the two-lane roundabout with a full four-lane interchange at Foys Lake Road. | Improves traffic operations and capacity for Foys Lake Section of the Kalispell Bypass and the overall performance of the Kalispell Bypass. | All users of the Kalispell Bypass network which includes freight and tourists. | Significant reduction in travel time and reduced fuel consumption and emissions. | Included in the Benefit-Cost Ratio. Estimated dollar value of time savings and fuel consumption. | Several sections of the BCA for Build Grant proposal includes the BC Ratio. Also, the attached spreadsheet shows the BC on the tabs: Executive Summary and Benefit Cost Analysis. |
| | | | | Improved capacity and travel time for regional and local freight carriers. | Freight carriers were not itemized in the Benefit-Cost Ratio but are a part of the overall results of the Benefit-Cost Ratio. | Included in the traffic modeling for the BC Ratio. Qualitative improvement as well as an improved freight corridor. |
| | | Increases system capacity and improves traffic operations for the Kalispell Urban Transportation System. | All users of the Kalispell Urban Network. | Improved traffic flow and capacity for the Kalispell Urban Area. | The Kalispell Urban Demand Model was updated with the proposed project and showed system-wide benefit. A monetary value was not assigned to this benefit in the study. | See Section 8 of the BCA for the Build Grant Proposal. |
| | | | | Improved traffic operations and congestion for Kalispell's Main Street (US 93) and downtown area by providing an enhanced alternative for truck traffic. | The Kalispell Urban Demand Model was updated with the proposed project and showed a capacity benefit to Main Street. A monetary value was not assigned to this benefit in the study. | See Section 8 of the BCA for the Build Grant Proposal. |
| | | Creates additional economic development opportunities for the Kalispell Urban Area by providing a traffic demand solution. | Northwest Montana, especially Flathead County. | Short and long term job creation as described in the Economic Impact Analysis of the Kalispell Bypass and 2018 update. | An Economic Impact Analysis of the Kalispell Bypass was performed in 2017 and an updated analysis was completed which included forecasting with the completed proposed project. | See Appendices B and C of the Build Grant Proposal. |
| | | Increased property values for the west side of Kalispell for both commercial and residential development. | Flathead County | Increased revenues from property taxes, higher property values for future development, and expanded areas of property development and local infrastructure expansion. | An Economic Impact Analysis of the Kalispell Bypass was performed in 2017 and an updated analysis was completed which included forecasting with the completed proposed project. | See Appendices B and C of the Build Grant Proposal. |

The Kalispell Bypass has been an economic generator for the region as described in the Economic Impact Analysis (EIA) which is also included in the grant application for this project. A current update of this EIA, which includes the construction of this project, is also included with the application materials. The Project Matrix shown in Table 1 provides a summary of the project's improvements and economic benefits.

The benefit-cost analysis used 2018 as the base year and projected out to 2040 to ensure that at least 20 years of projected evaluation was performed. The analysis projects the construction project starting in 2019 with a completion date at the end of 2020. This completion date is made possible because the Montana Department of Transportation (MDT) acquired the property for the project in 2009. This allows for expedited project delivery and completion to address the increasing traffic demand.

*Table 2: Executive Summary*

| Executive Data Summary<br>Kalispell Bypass : Foys Lake Section | | | | | | |
|---|---|---|---|---|---|---|
| Calendar Year | Direct Benefits (Reduction in Travel Time) | Total Benefits (2018 Value) | Total Initial Costs | Maintenance Costs (2018 Value) | Undiscounted Net Benefits (2018 Value) | Discounted Net Benefits (7%) |
| 2018 | | | ($8,208,512) | | | ($8,208,511.63) |
| 2019 | | | ($6,000,000) | | | ($5,607,476.64) |
| 2020 | | | ($14,039,124) | | | ($12,262,314.61) |
| 2021 | 391,943 | $8,253,131 | | ($37,153) | $8,215,978 | $6,706,685 |
| 2022 | 488,781 | $10,290,460 | | ($37,896) | $10,252,564 | $7,821,632 |
| 2023 | 585,619 | $12,327,790 | | ($38,654) | $12,289,136 | $8,761,984 |
| 2024 | 682,457 | $14,365,119 | | ($39,427) | $14,325,692 | $9,545,813 |
| 2025 | 779,294 | $16,402,449 | | ($40,216) | $16,362,233 | $10,189,576 |
| 2026 | 876,132 | $18,439,778 | | ($41,020) | $18,398,758 | $10,708,245 |
| 2027 | 972,970 | $20,477,108 | | ($41,841) | $20,435,267 | $11,115,431 |
| 2028 | 1,069,808 | $22,514,437 | | ($262,677) | $22,251,760 | $11,311,666 |
| 2029 | 1,166,646 | $24,551,766 | | ($43,531) | $24,508,235 | $11,643,686 |
| 2030 | 1,263,483 | $26,589,096 | | ($44,402) | $26,544,694 | $11,786,162 |
| 2031 | 1,360,321 | $28,626,425 | | ($45,290) | $28,581,135 | $11,860,155 |
| 2032 | 1,457,159 | $30,663,755 | | ($46,195) | $30,617,559 | $11,874,017 |
| 2033 | 1,553,997 | $32,701,084 | | ($47,119) | $32,653,965 | $11,835,299 |
| 2034 | 1,650,835 | $34,738,413 | | ($48,062) | $34,690,352 | $11,750,822 |
| 2035 | 1,747,673 | $36,775,743 | | ($49,023) | $36,726,720 | $11,626,739 |
| 2036 | 1,844,510 | $38,813,072 | | ($50,003) | $38,763,069 | $11,468,593 |
| 2037 | 1,941,348 | $40,850,402 | | ($51,004) | $40,799,398 | $11,281,374 |
| 2038 | 2,038,186 | $42,887,731 | | ($2,252,024) | $40,635,707 | $10,501,039 |
| 2039 | 2,135,024 | $44,925,060 | | ($53,064) | $44,871,996 | $10,837,174 |
| 2040 | 2,231,862 | $46,962,390 | | ($54,125) | $46,908,265 | $10,587,813 |
| Total | 26,238,047 | $552,155,209 | ($28,247,636) | ($3,322,727) | $548,832,482 | $187,135,604 |

The total project cost is $28.2 million with $8.2 million expended (FY 2018 value) for right-of-way acquisition and utility relocation leaving a $20 million cost balance to construct the project using the design-build method. The BUILD Grant request for the construction of this project is $15 million and the remaining $5 million is funding from MDT's National Highway allocation for the Missoula District.

Table 2 shows the results of the benefit-cost analysis for this project based on the traffic demand modeling from the Bypass corridor and the Kalispell Urban Area. Using a 7% discounting rate, the analysis shows a Net Present Value (NPV) of $187 million and a Benefit-Cost Ratio of 7.89. Table 3 shows the completed Benefit-Cost Analysis.

*Table 3: Benefit-Cost Analysis Summary*

| Benefit to Cost Ratio Analysis Summary | | | | |
|---|---|---|---|---|
| **Selection Criteria** | **Description** | **Inputs** | **Value** | **Monetary Value (Discount Rate = 7%)** |
| Economic Competitiveness | Replace current roundabout and two-lane facility with an interchange and four-lane facility to reduce travel time | Travel demand modeling produced average daily travel savings and was converted to annual savings | 26.2 million hours saved | $209,476,448 |
| Environmental Stewardship | Environmental Benefits from Reduced Emissions | $CO_2$ quantity reduction converted to monetary value | 30,276 metric tons of $CO_2$ saved | $494,589 |
| Quality of Life | Fuel savings due to travel time reduction | Gallons of fuel saved | 3,704,839 gallons of fuel saved | $4,323,028 |
| Quality of Life | Improved traffic capacity for the Kalispell Urban Area. Attracts truck traffic away from downtown Kalispell allowing for redevelopment | Included in travel demand modeling | Included in the economic competitiveness value | |
| Safety | Converting from a 2 lane to a 4 lane facility and converting to an interchange yields crash reductions | Future crash reduction for the 4 lane facility is expected at 66% and for the interchange a value of 38% is expected | Not calculated | |
| Total Cost | | | | ($27,158,461) |
| Total Benefits | | | | $214,294,065 |
| **Net Present Value** | | | | **$187,135,604** |
| **Benefit to Cost Ratio** | | | | **7.89** |

The benefit-cost analysis focused on numerical values for each selection criteria. The selection criteria were identified from the list of possible criteria in the BUILD Grant literature. They are based on the modeling analysis and the proposed project solution for the current performance issues which the Foys Lake Section experiences.

A quality of life criteria was included for the project's ability to attract truck traffic away from US 93, which is also called Main Street in the downtown area. Emphasis has been placed on reduction of truck traffic in the downtown area to improve the overall quality of life and economic vitality of this Core Area of the City of Kalispell. The safety criteria was included in this analysis as a future expected benefit for the expansion of the current facility from 2 lanes to 4 lanes and the installation of the interchange.

## Introduction

This Benefit-Cost Analysis is a support document which was written for the BUILD Grant application for the Kalispell Bypass: Foys Lake Section. It is an economic analysis supported by micro traffic demand modeling for the Kalispell Bypass, macro traffic demand modeling for the Kalispell Urban Area, and other technical data sets as applicable for qualitative and quantitative economic analyses.

The document begins by discussing the Methodology used for the benefit-cost analysis. The Project Description section provides a background and comparison of the current condition and the proposed build scenario. The Assumptions section discusses the assumptions used in the analysis for benefits and for costs which is followed by the Project Cost, Funding, and Schedule section. Project Outcomes details the qualitative and quantitative results of the study and leads into the section which outlines System Improvements. The document finishes with a brief discussion of the Sources used for this study.

## Methodology

A Benefit-Cost Analysis (BCA) is a process or systematic approach for calculating and comparing benefits and costs for options or alternatives to assist in making an informed decision on investment of funds. A BCA can be useful for determining if an investment is justified and what benefits can be attained from that investment. BCAs can also assist the investor as an analysis tool to compare multiple opportunities and determine which provides the greatest total benefit when compared to the total cost.

BCAs use data and modeling to help predict future benefits of an investment in relation to the costs of the investments. BCAs focus on numerical results but also describe benefits which are not numerically calculated but are important to economies and societies. A basic premise for a BCA is that an investment or action provide benefit to society given the costs of that investment or action. This is a question which transportation decision makers are faced with continuously.

The BCA methodology for the Kalispell Bypass: Foys Lake Section was developed using the BCA philosophy and principles discussed above and the BUILD Grant guidance for 2018. Specifically, the methodology for this project consists of:

- Define and describe the No-Build scenario and the Build scenario for the project.
- Establish the existing and future conditions expected for the project and the time period which will be analyzed.
- Identify benefits of the project based on the guidance provided by the BUILD Grant guidelines for long-term outcomes.
- Measure benefits and costs in monetary terms and ensure benefits and costs are measured appropriately based on the guidance provided.
- Assess benefits in accordance with the long-term outcomes described in the BUILD Grant Guidelines.

- Calculate the benefit valuation of the travel time savings and fuel savings benefits in accordance with BUILD Grant guidance and industry standards.

- Compile all project costs and benefits and discount for future benefits and costs of the project at the required discount rate.

## Project Description

The Kalispell Bypass is a regional arterial that was planned to serve as an Interstate-style transportation facility according to the 1994 EIS for the US 93 corridor from Somers to Whitefish. In 2010, the south half of the Bypass was built as a two-lane interim design with roundabouts at the intersections along the corridor. In 2016, the north half of the Bypass was built as a four-lane configuration with interchanges at the intersections along the corridor. This represented a complete connection of the 7-mile planned Bypass from US 93 south of the Kalispell Urban Area to US 93 north of the Kalispell Urban Area.

Since the Bypass was fully connected from north to south in 2016, traffic demand on the facility has increased at an unexpected high rate. This increase in traffic growth on the Bypass has caused significant congestion at the Foys Lake Roundabout which is the transition point from the interim two-lane design on the south half to the four-lane design on the north half. The traffic congestion and delay at the Foys Lake Roundabout has led MDT, the City of Kalispell, and Flathead County to consider design solutions.

### Baseline Condition – No Build

The Foys Lake Section is a two-lane transportation facility which is 1.9 miles long and represents the north section of the south half of the Bypass. The Foys Lake Roundabout in this section represents the transition point where the Bypass expands from two lanes to four lanes. Current traffic volume modeling shows that volumes at the single-lane roundabout are over 19,000 average annual daily traffic (AADT). Current traffic volume data also shows that some of the sections of the north half of the Bypass are experiencing similar volumes.

Future traffic volume predictions conducted in 2016 suggested this volume would not be experienced until 2040. The No Build scenario was analyzed at the current 2018 conditions and at the projected 2040 future condition. Given the current congestion levels at the Foys Lake Roundabout in the Foys Lake Section, the 2040 No Build scenario shows significant travel time delay, increased congestion levels, and a general breakdown in the level of service for the traveling public.

### Build Alternative

The Build alternative is a construction project which transforms the 1.9-mile Foys Lake Section to a four-lane facility and replaces the Foys Lake Roundabout with an interchange. This alternative provides free-flow traffic conditions and significantly reduces traffic delay and reduces fuel consumption. The 2018 Build Scenario shows immediate relief to the traffic delay and congestion and the 2040 Build Scenario shows considerable improvement in traffic delay and congestion. It also shows substantial reductions in network delay and lower fuel consumption.

The travel demand modeling shows that this section of the Bypass will reach nearly 40,000 AADT in the 2040 Build Scenario. A single-lane roundabout is not designed to effectively handle this type of traffic

volume and will cause substantial travel time delay if not addressed. The travel time benefits arrived at in this analysis suggest the Build Scenario is an essential project for the Kalispell Bypass to effectively meet the travel demands expected to occur in the next 20 years.

## Inputs and Assumptions

The inputs used in this BCA to calculate benefits are from travel demand modeling for the project and for the Kalispell Urban Area. To calculate the project costs, MDT provided cost information for past expenditures and an estimation for construction costs using the design-build method. Assumptions for both project benefits and costs are generally described in this section. All costs and benefits were discounted at 7% and the analysis time period was based on MDT standard project design life. MDT designs its projects with a minimum 20-year design life and provides a predicted traffic volume that the project is expected to reach in 20 years after the project is constructed.

This BCA used 2018 as the base modeling year as recent traffic counts and modeling exercises have recently been completed for the Kalispell Bypass and the Kalispell Urban Area. The schedule proposed with this grant application is based on the project opening to traffic by the end of 2020. The BCA used 2040 as the forecasted future year based on the project completion year plus a 20 year design life. The modeling runs included in this BCA are the base year of 2018 with the No-Build scenario and the Build scenario and it analyzes the future year of 2040 with the No-build scenario and the Build scenario.

### Benefits

A regional travel demand model was developed by MDT using TransCAD software. The model was built and calibrated to existing conditions. Future land use and transportation forecasting was conducted through a series of workshops with local officials. The travel demand model was used to evaluate projected changes in traffic volumes and traffic patterns under the build scenario.

The results of the travel demand model were used as inputs into a network microsimulation model using Synchro software, which is a widely used for traffic modeling. The microsimulation model was used to evaluate changes in travel times, network delay, and fuel consumption between the no-build and build scenarios. As shown in Tables 1 and 2 of this report, the build scenario resulted in considerable savings in travel time, substantial reductions in network delay, and lower fuel consumption.

### Costs

Initial project costs for this BCA include right-of-way acquisition costs, utility relocation costs, and estimated design-build construction costs. The right-of-way acquisition costs and utility relocation costs occurred in 2009 just prior to the construction of the current two-lane design and roundabout for the Foys Lake Section of the Bypass. MDT provided the design-build construction costs for this grant application and provided a detailed cost breakdown per their design-build process and estimation database for design-build projects.

Operation and maintenance costs were provided by the MDT Kalispell Maintenance Division. The initial cost was based on current lane-mile costs in the Kalispell Division and includes all additional lane miles added to the system and annual maintenance for the Foys Lake Interchange. Operation and maintenance costs are expected to increase by an average of 2% per year. MDT expects to perform two

pavement preservation projects on this section of the Bypass during the 20-year design life and those values are reflected in the operation and maintenance costs for 2028 and 2038.

## Project Cost, Funding, and Schedule

The total project cost for the Kalispell Bypass: Foys Lake Section is shown in Table 4. The project cost is the design-build estimate for constructing the four-lane configuration for the 1.9-mile section and the cost of the interchange. Table 4 also shows the previous right-of-way and utility costs from 2009.

*Table 4: Project Cost Estimate*

**PRELIMINARY COST ESTIMATE**

**Project No.:** TBD **Date Prepared:** July 2, 2018
**Control No.:** 2038
**Project Name:** KBP - Foys Lake Road Interchange - Design Build Project **IDC:** 10.96%
**Estimate Prepared By:** Jake Goettle, P.E., DBIA
(Based on preliminary CN estimate provided by project split memo.)

***Design and Engineering Costs***

| | ITEM DESCRIPTION | QUANTITY | UNIT | UNIT PRICE | AMOUNT |
|---|---|---|---|---|---|
| I. | **PRELIMINARY ENGINEERING [*9102*]** | | | | |
| | MDT PE Costs (After Award) | 1 | LS | $50,000.00 | $50,000 |
| | **IDC** | 10.96% | | | $5,480 |
| | **SUBTOTAL =** | | | | **$55,480** |
| | Stipend Payments to DB Firm | 3 | EA | $150,000.00 | $450,000 |
| | Design Services (D-B Firm) | 1 | LS | $750,000.00 | $750,000 |
| | **IDC** | 10.96% | | | $131,520 |
| | **SUBTOTAL =** | | | | **$1,331,520** |
| II. | **CONSTRUCTION ENGINEERING AND INSPECTION (CEI) SERVICES [*9402*]** | | | | |
| | MDT CEI Costs | 1 | LS | 8% | $1,346,053.10 |
| | **IDC** | 10.96% | | | $147,527 |
| | **SUBTOTAL =** | | | | **$1,493,581** |
| | CEI Costs (D-B Firm) | 1 | LS | $300,000.00 | $300,000 |
| | **IDC** | 10.96% | | | $32,880 |
| | **SUBTOTAL =** | | | | **$332,880** |
| III. | **INCIDENTAL CONSTRUCTION [*9302*]** | | | | |
| | Utility Design/Coordination | 1 | LS | $0.00 | $0 |
| | Utility Relocation Costs | 1 | LS | $0.00 | $0 |
| | **IDC** | 10.96% | | | $0 |
| | **SUBTOTAL =** | | | | **$0** |

***Construction Costs***

| | | | | | |
|---|---|---|---|---|---|
| IV. | **CONSTRUCTION [*9502*]** | | | | |
| | Construction of interchange and 4 lane connections. Includes mobilization, project administration, scheduling, quality control, misc work, etc. | 1 | LS | $13,000,000.00 | $13,000,000 |
| | **IDC** | 10.96% | | | $1,424,800 |
| | **SUBTOTAL =** | | | | **$14,424,800** |
| V. | **CONTINGENCY** | 1 | % | 15% | $2,163,720 |
| | **IDC** | 10.96% | | | $237,144 |
| | **SUBTOTAL =** | | | | **$2,400,864** |

| | |
|---|---|
| **SUBTOTAL ESTIMATED MDT PE COST =** | **$55,480** |
| **SUBTOTAL ESTIMATED MDT CE COST =** | **$1,493,581** |
| **SUBTOTAL ESTIMATED D-B PE COST =** | **$1,331,520** |
| **SUBTOTAL ESTIMATED D-B CE COST =** | **$332,880** |
| **SUBTOTAL ESTIMATED D-B CONSTRUCTION COST =** | **$16,825,664** |
| **SUBTOTAL ESTIMATED DESIGN-BUILD CONTRACT COST =** | **$18,490,064** |
| **TOTAL ESTIMATED DESIGN-BUILD CONSTRUCTION COST =** | **$20,039,124** |

***Right-of-Way & Utility Costs***

| YEAR | PROJECT NAME | R/W & UTILITY COST |
|---|---|---|
| 2009 | AIRPORT RD TO FOYS ROAD : KALISPELL - INTERIM | $2,987,270 |
| 2009 | FOYS LAKE RD TO US 2 : KALISPELL - INTERIM | $4,250,000 |

| | |
|---|---|
| **TOTAL R/W & UTILITY COST =** | **$7,237,270** |
| **TOTAL R/W & UTILITY COST - 2018 VALUE =** | **$8,208,512** |
| **TOTAL ESTIMATED PROJECT COST FOR 2018 =** | **$28,247,636** |

A breakdown of the project funding is provided in Table 5 shown below. The total project cost is $28.2 million which includes right-of-way acquisition and utility relocation. For the purposes of this analysis, these activities which took place in 2009 were inflated to 2018 values. To complete the project, $20 million to fund a design-build construction project is required. The BUILD Grant request for this project is $15 million and remaining funds will come from MDT's National Highway program for the Missoula District. The BUILD Grant request represents 53% of the total project cost. The current project investment amount prior to this grant request is $8.2 million or 29% of the total project cost.

*Table 5: Project Funding*

| Project Funding - Kalispell Bypass - Foys Lake Section | |
|---|---|
| **Funding Sources** | **Amount (Millions)** |
| **Total Project Cost - Foys Lake Section** | **$28.2** |
| MDT - Right-of-Way Acquistion & Utility Relocation - 2018 Value | $8.2 |
| MDT - Design-Build Construction Project | $20.0 |
| | |
| **MDT - Design-Build Construction Project Breakdown** | **$20.0** |
| MDT - National Highway - Missoula District Funding - Federal Share | $4.3 |
| MDT - National Highway - Missoula District Funding - State Match | $0.7 |
| BUILD Grant Request | $15.0 |
| | |
| BUILD Grant - Percent of Total Project Cost | 53% |
| MDT Right-of-Way & Utility Costs and Project Funding Commitment | 47% |
| | |
| *MDT acquired the right-of-way necessary for the four-lane configuration in 2009.* | |

The project schedule is based on the design-build method of delivery and is shown in Table 6. If a BUILD Grant is awarded to this project, the design-build selection process would begin immediately in January 2019. MDT's design-build process would be utilized as it is a proven process for that agency as standard practice for contracting projects. The selection process would be complete in June 2019 resulting in awarding the project to the top scoring design-build firm. The selected firm would be required to complete construction of the project by December 30, 2020.

The design-build method of delivery offers several key advantages to constructing this project. The project will be delivered with an accelerated design to construction schedule. This will reduce impacts to traffic during construction, which is substantial given the project's current volume of traffic. Design-build firms have the opportunity to incorporate innovative solutions, materials, and ideas to the project and its delivery. Design-build delivery allows for concurrent design and construction activities which will be ideal for this project as the selected firm can construct certain features in the winter months while planning and designing for other features which will commence in the spring and summer months.

The design-build delivery method for this project is possible because of prior right-of-way acquisition and utility relocation. The project can be constructed in the right-of-way MDT purchased and the environmental permitting required for this project is standard practice with no abnormal requirements and represents low impact to the affected project area. Right-of-way acquisition and environmental permitting represent issues which typically delay delivery of a transportation project.

That is not the case with this project which means it is low risk for failure to deliver and an ideal design-build project and BUILD Grant project. Through the BCA analysis, the project has demonstrated the current condition is experiencing significant delay and that condition will continue to degrade. The requested $15 million BUILD Grant will provide timely relief to this situation. As the analysis shows, building this project as soon as possible will provide tremendous benefit to the traveling public.

*Table 6: Project Schedule*

| Project Schedule - Kalispell Bypass - Foys Lake Section | |
|---|---|
| **Task** | **Schedule** |
| Grant Notification | December 2018 |
| Begin Design-Build Request For Proposal Process | January 2019 |
| Design-Build Selection Process | February - May 2019 |
| Award of Design-Build Contract | June 2019 |
| Initial Design & Contract Permitting | July 2019 - November 2019 |
| Utility Relocation and Coordination | September 2019 - May 2020 |
| Start of Construction - Foys Lake Detour | September 2019 - October 2019 |
| Foys Lake Roundabout Removal | September 2019 - October 2019 |
| Foys Lake Interchange Bridge Construction | October 2019 - August 2020 |
| Foys Lake Interchange Ramp Construction | October 2019 - May 2020 |
| Kalispell Bypass Earthwork | March 2020 - June 2020 |
| Project Gravel Surfacing & Paving | June 2020 - July 2020 |
| Bridge Completion | August 2020 |
| Chip Seal | August 2020 |
| Final Cleanup & Seeding | August 2020 - November 2020 |
| Project Completion | December 2020 |
| *The proposed schedule listed above is an example of the schedule of work which will be contracted to be complete by December 2020. The Design-Build contract method allows for expedited project delivery and for innovation of project scheduling and the incorporation of value added materials and products.* | |

## Project Outcomes

There are five project outcomes which this section will cover and a discussion to the economic impact analysis that was performed for the Bypass. The first is the economic competitiveness which is travel time savings calculated in the BCA. The study also covers environmental stewardship based on emissions reduction. The quality of life criteria looks at both a fuel savings calculation and the system wide travel time improvement for the Kalispell Urban Area. The study also looked at future expected safety benefits the project produces. The final area of discussion for project outcomes is the economic generation that the Kalispell Bypass has produced for the region which will increase with the construction of this project.

The Net Present Value of the project is $187,135,604 and the Benefit-to-Cost Ratio is 7.89:1. The Total Benefits are calculated at $214,294,065 with a 7% discount rate and the Total Cost is calculated at $27,158,461 with a discount rate of 7%. The Total Benefits calculation includes travel time savings, $CO_2$ reduction savings, and fuel savings. The Total Cost includes initial project costs and the operations and maintenance costs over the analysis period.

*Table 7: Project Benefit-Cost Analysis*

| Benefit to Cost Ratio Analysis Summary | | | | |
|---|---|---|---|---|
| **Selection Criteria** | **Description** | **Inputs** | **Value** | **Monetary Value (Discount Rate = 7%)** |
| Economic Competitiveness | Replace current roundabout and two-lane facility with an interchange and four-lane facility to reduce travel time | Travel demand modeling produced average daily travel savings and was converted to annual savings | 26.2 million hours saved | $209,476,448 |
| Environmental Stewardship | Environmental Benefits from Reduced Emissions | $CO_2$ quantity reduction converted to monetary value | 30,276 metric tons of $CO_2$ saved | $494,589 |
| Quality of Life | Fuel savings due to travel time reduction | Gallons of fuel saved | 3,704,839 gallons of fuel saved | $4,323,028 |
| Quality of Life | Improved traffic capacity for the Kalispell Urban Area. Attracts truck traffic away from downtown Kalispell allowing for redevelopment | Included in travel demand modeling | Included in the economic competitiveness value | |
| Safety | Converting from a 2 lane to a 4 lane facility and converting to an interchange yields crash reductions | Future crash reduction for the 4 lane facility is expected at 66% and for the interchange a value of 38% is expected | Not calculated | |
| Total Cost | | | | ($27,158,461) |
| Total Benefits | | | | $214,294,065 |
| **Net Present Value** | | | | **$187,135,604** |
| **Benefit to Cost Ratio** | | | | **7.89** |

## Economic Competitiveness

This benefit-cost analysis shows the project will provide travel time savings, fuel savings, and $CO_2$ reduction over the existing condition. These improvements were calculated from outputs provided by macro-level modeling for the Kalispell Urban Area and micro-level modeling for the Kalispell Bypass: Foys Lake Section. The BCA follows the guidance set forth in BUILD Grants Notice of Funding Opportunity for 2018. The BCA summary is shown in Table 7.

The greatest benefit for this BCA is the travel time savings for the economic competitiveness criteria. Nearly all the monetary benefit for this BCA comes from travel time the project will save over the analysis period. The TransCAD regional travel demand was developed for this grant application and used to show regional impacts which this project would have on the transportation system. The results of this modeling were input into a network microsimulation model for the Kalispell Bypass using Synchro software.

The microsimulation model created four outputs for traffic analysis purposes. The outputs were No-Build 2018, Build 2018, No-Build 2040, and Build 2040. Two additional outputs were produced: No-Build and Build scenarios for 2020. The outputs generated peak volumes for AM Peak, Noon, and PM Peak in all scenarios and were used to calculate a 24-hour average volume of daily travel time saving. Fuel savings was also provided with each modeling scenario.

The 2018 No-Build versus 2018 Build scenario outputs were compared for travel time savings and fuel savings. The comparison showed a significant savings for both travel time and fuel consumption. The 2040 No-Build versus 2040 Build scenarios were compared for travel time and fuel savings. The comparison showed a substantial savings for travel time and a significant savings for fuel consumption.

Because the existing two-lane facility with the roundabout does not have the capacity of a four-lane facility and interchange, the growth rate for the existing condition is 2.3% and for the build condition it is 3.1%. With the savings calculations complete for 2018 and for 2040, the results from these years were pro-rated for the remaining years in the analysis period. Using the monetary values provided in the BUILD Grant guidance, annual travel time savings were calculated. For the calculation of fuel savings, $3/gallon was used, uninflated, for the period of analysis.

From a transportation perspective, constructing the four-lane facility with the interchange provides significant travel time benefits. As the analysis shows, constructing the project at the beginning of the analysis period provides substantial benefit utilizing current construction costing which will likely never be less than what is estimated in this analysis. Construction costs will likely increase over time due to inflation and will increase on this project as a contracting firm will be required to contend with additional traffic growth which usually translates into additional risk and cost to the project.

## Environmental Stewardship

As mentioned above, the microsimulation Synchro modeling provided daily fuel savings which was converted to annual fuel savings. From the fuel savings, the reduction of $CO_2$ in metric tons could be calculated. EPA guidance was used to estimate a monetary value per metric ton of $CO_2$ to calculate the value of the reduction. The monetary value selected for this analysis was $42 per metric ton. The analysis shows that 30,276 metric tons will be saved over the analysis period. Table 8 shows the fuel savings and the $CO_2$ reduction.

*Table 8: Fuel Savings and $CO_2$ Reduction*

| Fuel Savings & $CO_2$ Reduction<br>Kalispell Bypass - Foys Lake Section | | | | |
|---|---|---|---|---|
| | Fuel Saved (gallons) | Vehicle Fuel Savings @ $3.00/gal | $CO_2$ Reduced (Metric Tons) | $CO_2$ Value @ $42/Metric Ton |
| 2018 | | | | |
| 2019 | | | | |
| 2020 | | | | |
| 2021 | 56,855 | $170,564 | 465 | $19,514 |
| 2022 | 70,369 | $211,108 | 575 | $24,152 |
| 2023 | 83,884 | $251,651 | 685 | $28,791 |
| 2024 | 97,398 | $292,194 | 796 | $33,429 |
| 2025 | 110,913 | $332,738 | 906 | $38,068 |
| 2026 | 124,427 | $373,281 | 1,017 | $42,706 |
| 2027 | 137,941 | $413,824 | 1,127 | $47,345 |
| 2028 | 151,456 | $454,368 | 1,238 | $51,983 |
| 2029 | 164,970 | $494,911 | 1,348 | $56,622 |
| 2030 | 178,485 | $535,454 | 1,459 | $61,260 |
| 2031 | 191,999 | $575,997 | 1,569 | $65,899 |
| 2032 | 205,514 | $616,541 | 1,679 | $70,537 |
| 2033 | 219,028 | $657,084 | 1,790 | $75,176 |
| 2034 | 232,542 | $697,627 | 1,900 | $79,814 |
| 2035 | 246,057 | $738,171 | 2,011 | $84,453 |
| 2036 | 259,571 | $778,714 | 2,121 | $89,091 |
| 2037 | 273,086 | $819,257 | 2,232 | $93,730 |
| 2038 | 286,600 | $859,801 | 2,342 | $98,368 |
| 2039 | 300,115 | $900,344 | 2,453 | $103,007 |
| 2040 | 313,629 | $940,887 | 2,563 | $107,645 |
| Total | **3,704,839** | **$11,114,516** | **30,276** | **$1,271,590** |

*For the $CO_2$ analysis, assumed 18.0 lbs per gallon of fuel based on data provided by the U.S. Energy Information Administration. Also, the EPA's Fact Sheet for the Social Cost of Carbon listed $42 per metric ton of $CO_2$ for the year 2020 at a 3% Average for Discount Rate and Statistic.*

The design-build construction project will require update of the past environmental document, sound mitigation review, and the necessary construction permitting to perform the work. A review of the area shows no significant impacts for the proposed construction project in the Foys Lake Section.

## Quality of Life

The quality of life value used in this analysis was for the fuel savings which was calculated at $3/gallon uninflated over the analysis period. The study shows a fuel savings of 3,704,839 gallons will be realized over the analysis period. While the fuel savings is derived from a more efficient system, it does not take into account the driver frustration which is typically experienced in situations where traffic congestion exists. The analysis does not take into account the operational cost savings for vehicles where free-flow conditions exist compared to congested driving conditions like the Foys Lake Roundabout situation.

The second quality of life entry listed is the system improvement that the Kalispell Urban Area will see with the construction of the project. In the next section of this report, maps for the Kalispell Urban Area are included which show the effects on the system under the four modeling scenarios used in this study. They show an overall improvement in the system's performance with the construction of the project.

One area of interest for quality of life improvement is US 93, which is Main Street in the Downtown Core Area of Kalispell. Main Street is a typical urban highway with a series of traffic signals which create stop-and-go driving conditions. There is also an effort underway to transform the Kalispell Downtown Core Area into a destination area which has bicycle and pedestrian facilities.

To achieve this result, it is desirable to reduce truck traffic on Main Street by offering other alternative routes. The Kalispell Bypass is listed as US 93 Alternate Route and offers truck traffic a free-flow driving condition more like the Interstate system rather than the current stop-and-go condition which exists downtown. Constructing the Foys Lake Section will attract additional truck traffic and offer an efficient alternate route for all traffic around Kalispell. This will help with future traffic demand and assist in the redevelopment of Kalispell's Downtown Core Area.

## Safety

According to the Crash Modification Clearinghouse, converting a 2-lane roadway to a 4-lane divided roadway is expected to yield a crash reduction factor of 65.88% for all crash severities and types within an urban setting. Also, a crash reduction factor of 38.00% for all crash severities and types can be expected for the construction of a diamond interchange like that proposed for Foys Lake.

Since these are projected values based on current data for a broad spectrum, they are not included in the numerical evaluation for this BCA. While the primary focus of this study is on travel time savings, it is important to note that the proposed project is expected to provide safety benefits for both the expansion from two-lanes to four-lanes and the construction of the interchange.

## Economic Impact Assessment

Attached to this grant application is the Economic Impact Analysis (EIA) for the Construction of the Kalispell Bypass. This EIA was conducted last year and used three data sets as inputs into the Flathead County IMPLAN Model which was created for the project. The inputs are Bypass design and construction cost data, commercial and residential construction attributed to the construction of the Bypass, and employment data attributable to the construction of the Bypass. The study shows that the construction of the Kalispell Bypass produced over $1 billion in economic impacts to date. Refer to the EIA attached to this application for additional details and information.

Also attached to this grant application is an update to the EIA. Commercial and residential development continues to occur which can be attributed to the construction of the Kalispell Bypass. The development of the update to the EIA is for the purposes of this grant application and includes the projected construction costs of the Foys Lake project. The updated EIA is meant to support the BCA and the overall benefit the Foys Lake project will have on the Kalispell Urban Area and Northwest Montana.

## Kalispell Urban Area Maps

Four Kalispell Urban Area Maps were created for the purpose of this study. They are 2017 No-Build Scenario, 2017 Build Scenario, 2040 No-Build Scenario, and 2040 Build Scenario. They were created by MDT using TransCAD software. These macro-level models are from the year 2017 as that is the latest complete year data is available. The microsimulation Synchro models used these 2017 macro-level models as inputs in its 2018 base year modeling.

The maps highlight the urban area in which the project is contained and show ranges for traffic volume to capacity (v/c) and vehicle flows in terms of traffic volumes. The importance of the Foys Lake project becomes apparent in the 2040 scenarios with the expected increased vehicle demands placed on the Kalispell Urban Area system.

*Table 9: Kalispell Bypass – Location Map*

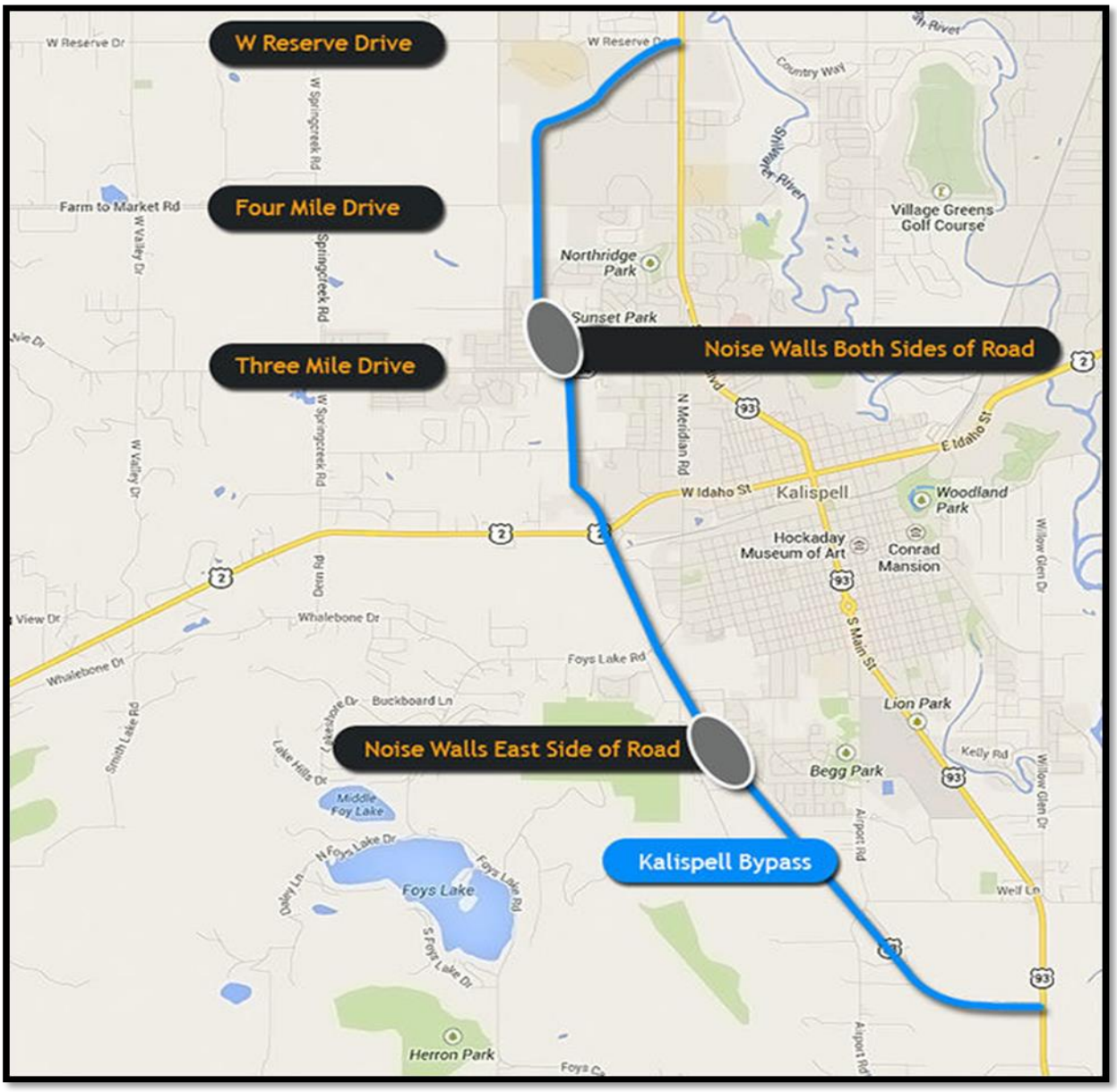


*Table 10: Kalispell Urban Area Map – 2017 No Build Scenario*

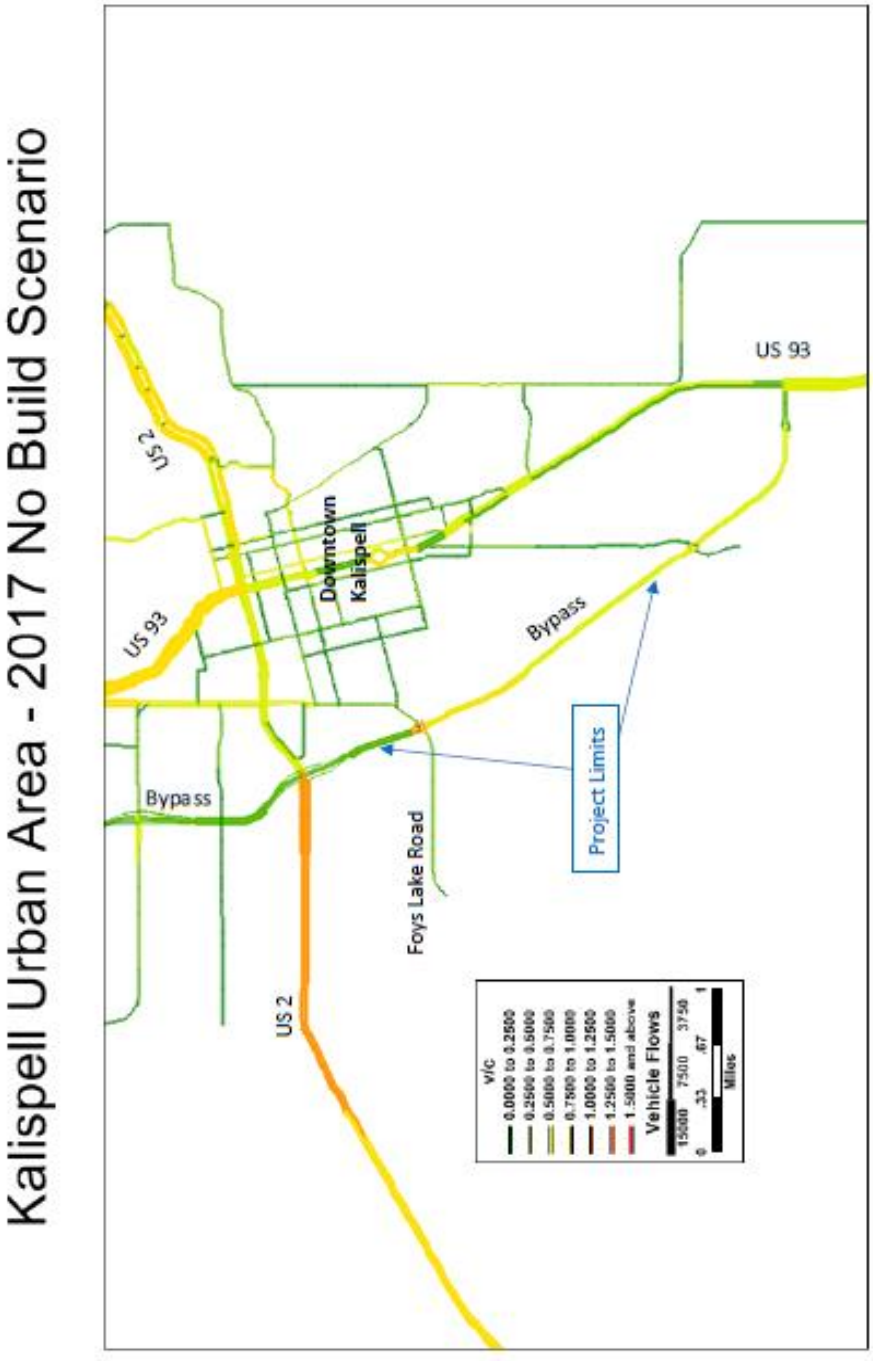


*Table 11: Kalispell Urban Area Map – 2017 Build Scenario*

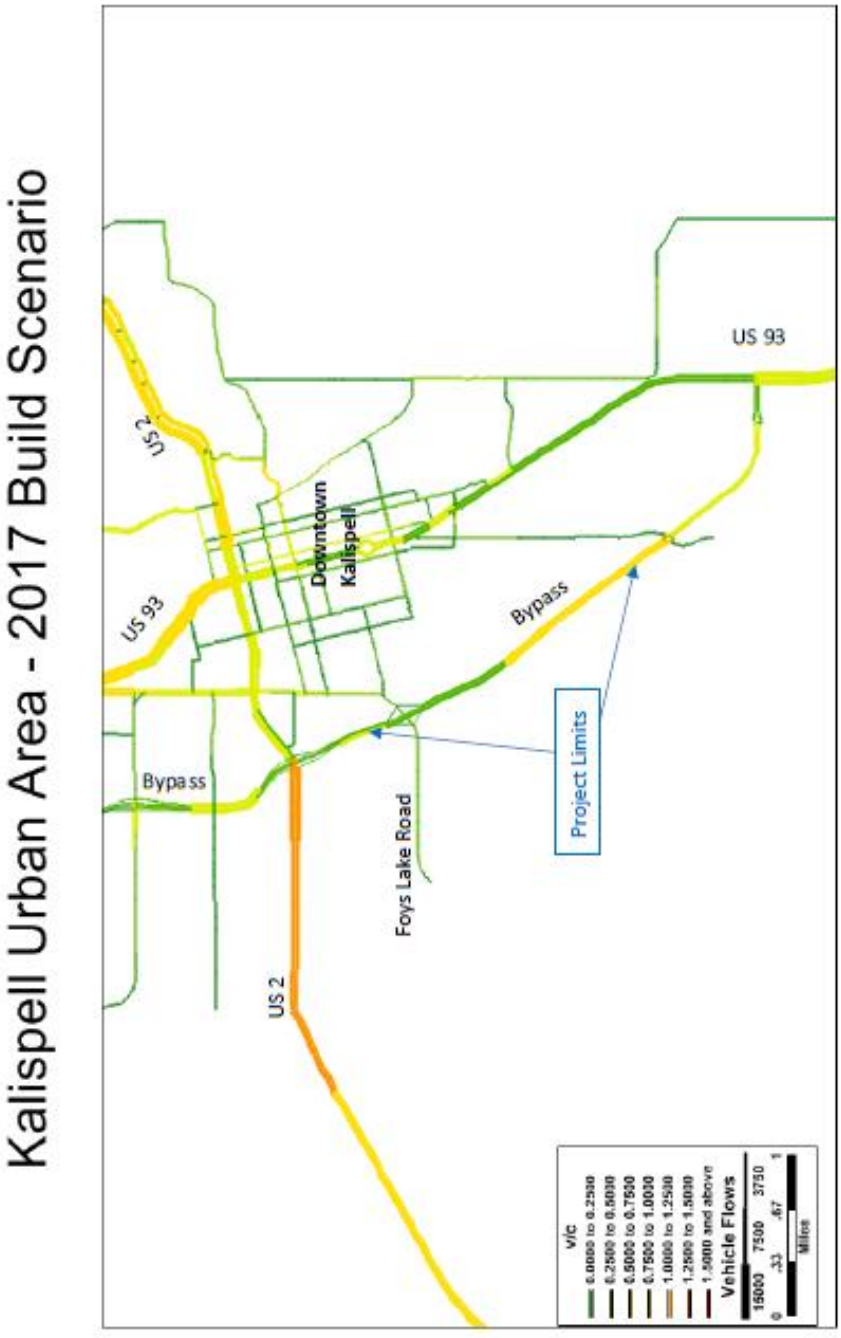


*Table 12: Kalispell Urban Area Map – 2040 No-Build Scenario*

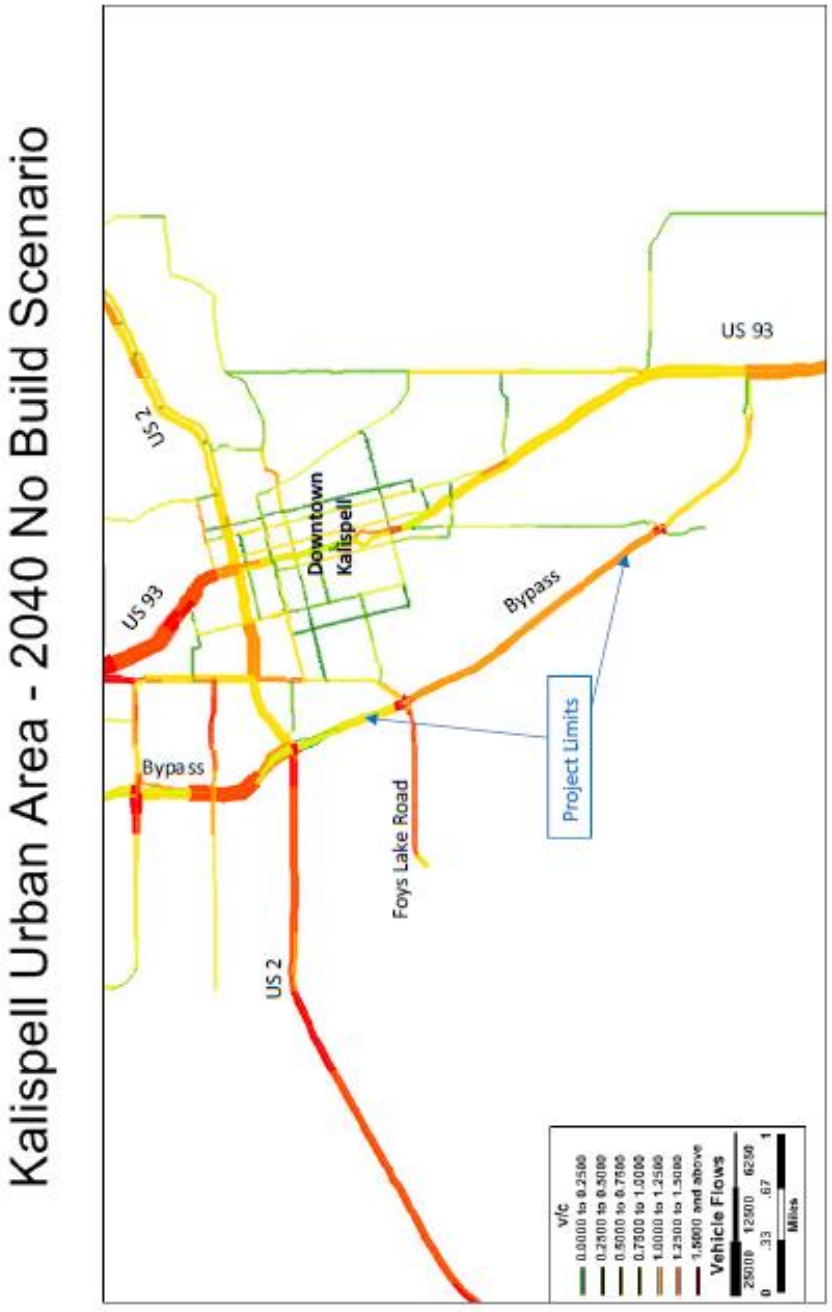
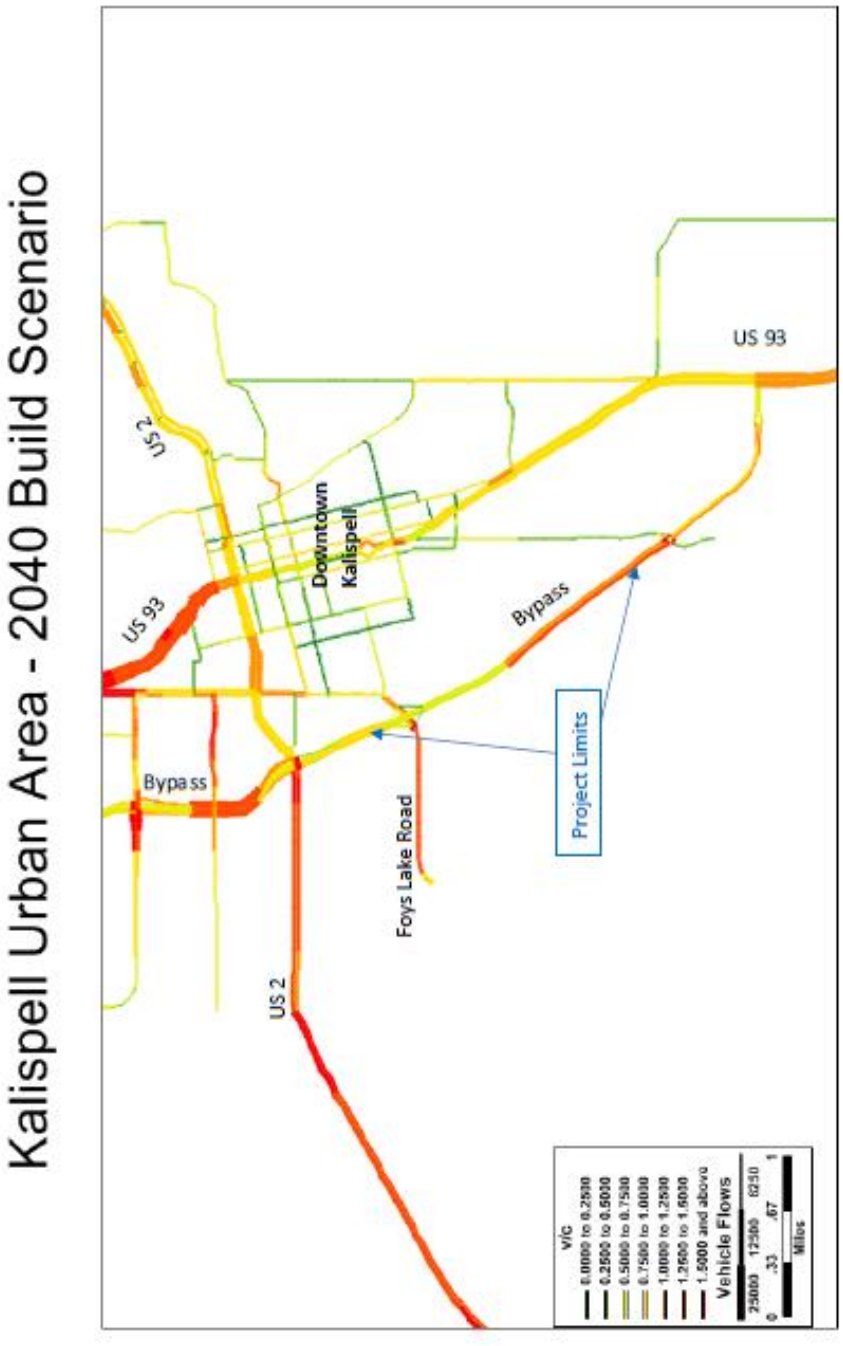


*Table 13: Kalispell Urban Area Map – 2040 Build Scenario*



## Sources

The following sources were used in the development of this report:

- Montana Department of Transportation Traffic and Safety Data
- Montana Department of Transportation Travel Demand Modeling
- Robert Peccia Traffic Modeling and Synchro Microsimulation
- City of Kalispell Land Development Data
- City of Kalispell Downtown Master Plan
- Multiple sources as listed in the Benefit Cost Analysis Excel Workbook
- The Economic Impact of the Construction of the Kalispell Bypass